

TruScan Neurofeedback User guide

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INTRODUCTION

Warranty

Warranty

Deymed warrants that each product we sell you is free from defects in labor and materials and shall conform to its product specifications as defined in the user documentation. If the product does not function as warranted during the warranty period, we will repair or replace it without charge. If in our judgment we are unable to do so, you may return it to us and we will refund your money.

Warranty Period

The warranty period is stated in the product user documentation. If you install the product, the warranty period begins on the date of invoice. If we install the product, the warranty period begins on the date of installation but will begin no later than 30 days from the date of invoice. The warranty period for products is 12 months from the date of installation or 13 months from the date of shipment, whichever is less.

Misuse, accident, modification, unsuitable physical or operating environment, improper maintenance, or damage caused by a product for which we are not responsible may void the warranty. Certain components may have separate warranty periods as stated in the product user documentation. Consumables are not covered under warranty.

THIS WARRANTY REPLACES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED AND OR ANY OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF DEYMED. WHETHER IN CONTRACT, WARRANTY, NEGLIGENCE OR OTHERWISE, DEYMED SHALL NOT BE LIABLE FOR AND DISCLAIMS ALL CONSEQUENTIAL, INCIDENTAL AND CONTINGENT DAMAGES.

Items Not Covered by Warranty

We do not warrant uninterrupted or error-free operation of a product. We provide certain non-Deymed products on an “as is” basis. Non-Deymed manufacturers or suppliers may provide their own warranties to you.

Customer Responsibility

This product and its components will perform reliably only when operated, maintained and stored in accordance with the instructions contained in this manual, accompanying labels and inserts. A defective product should not be used. Parts which may be broken or missing or those that are clearly worn, distorted or contaminated should be replaced immediately with clean, genuine replacement parts that have been manufactured, supplied or approved by Deymed. The responsibility of Deymed Diagnostic for a non-functioning product is limited by the warranty set forth in this guide. Should repair or replacement of this product become necessary after the expiration of the warranty, the customer should seek advice from Deymed prior to such repair or replacement. If this product is in need of repair, it should not be used until all repairs have been made and the unit is functioning properly and is ready for use. The owner of this product has the

sole responsibility for any malfunction resulting from improper use or maintenance, or repair done by anyone other than a qualified Deymed Diagnostic representative and from any malfunction caused by any parts that have been damaged or modified by anyone other than a qualified Deymed Diagnostic representative.

Attention

The information in this document is subject to change without notice. Deymed Diagnostic s.r.o. makes no warranty of any kind with regard to this material, including, but not limited to the implied warranties of merchantability and fitness for a particular purpose. Deymed assumes no responsibility for any errors that may appear in this document. Deymed makes no commitment to update nor to keep current the information contained in this document. No part of this document may be copied or reproduced in any form or by any means without prior written consent of Deymed Diagnostic.

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Trademarks and Regulatory Standards

Trademarks

Deymed Diagnostic has made every effort to supply trademark information about the products mentioned in this document.

The following list of trademarks was obtained from various sources:

TruScan Neurofeedback™ is a trademark of Deymed Diagnostic.

Microsoft® is a registered trademark of the Microsoft Corporation.

Windows™ is a trademark of the Microsoft Corporation.

Regulatory Standards

The Deymed TruScan Neurofeedback system meets the following standards set by domestic and international regulatory agencies for medical electronic equipment:

- IEC/EN 60601-1:2006 General Requirements
- IEC/EN 60601-1-1:2001 Systems Requirements
- IEC/EN 60601-1-4:1996
- IEC/EN 60601-2-26:2003
- IEC/EN 60601-1-2:2007
- IEC/EN 60950-1 ed.2:2006

Compliance

Deymed Diagnostic s.r.o. is an ISO 13485-certified corporation.

TruScan Neurofeedback is a FDA Registered Biofeedback Device (HCC)

The CE 1015 Mark identifies compliance with the Medical Device Directive (MDD) 93/42/ EEC.

The TruScan Neurofeedback is classified as a **Class IIa** device equipment according to the rules of the Medical Device Directive (MDD) 93/42/ EEC and a **Class II (Special Controls)** Biofeedback Device with the US FDA.

In regards to electrotechnical classification, the TruScan Neurofeedback is classified as a Class I electrical device (**IEC 60601**) equipment in which protection against electric shock does not rely on basic insulation only, but includes a grounding pin on the power cord. For ground reliability

always plug the power cord into an AC grounded outlet.

Type BF Equipment: The TruScan Neurofeedback is a Type B piece of equipment with an F-Type applied part. A Type B piece of equipment is one that provides a particular degree of protection against electric shock, particularly regarding allowable leakage current and reliability of the protective earth connection (grounding). F-Type applied part is one that extends from the patient into the equipment and is isolated from all other parts of the equipment.



EMI, by its very nature, can be a source of possible disturbance to electronic equipment. This device should be used in an environment free* of other equipment that could be affected by interference.

*Environment free as described in IEC1000-2-3, Part 2, 1992, First Edition.

About the System and Warnings

About the System

Indication for use: Relaxation training and muscle reeducation.

Hardware: The TruScan Neurofeedback system features a portable battery powered Amplifier and optically isolated USB adapter to connect to the users computer.

Software: The TruScan Neurofeedback software is designed to be easy to use by implementing a dashboard style interface with important controls accessible directly on the main interface screen.

Additional features of the TruScan Neurofeedback system:

- Fiber Optic isolation and battery operation for superior signal
- High Sample rates of all channels at 4,096 Hz per channel
- Small footprint and modular for portable use

Installation

Installation is performed via the TruScan Install file name 'TruScan_Install.exe' that is found on the Install CD that came with the system or downloadable from the Deymed website at www.deymed.com/support. Start the install by clicking on the 'TruScan_Install.exe' file and follow the on-screen instructions.

Any computer may be used provided it meets the following minimum specifications:

- at least 250 MB of free hard disc space;
- Windows 7 (preferred) or Windows XP;
- Intel Dual Core processor or better (or AMD equivalent or better);
- 2 GB Ram or more for the operating system;
- Display native resolution must be at least 1280x900 (be especially careful when purchasing a laptop to check its native resolution);
- 3D game graphics: NVIDIA or AMD (ATI) - for Neurofeedback 3D games, Note: Intel embedded graphics cards may not work properly;
- Free USB Port connection;

NOTE: Multi-Parameter DVD Player for Neurofeedback only supported on Windows 7

Entering Commands to the system

You enter commands, text or values by clicking or typing a series keys in the program's interface. You may also use a mouse to perform these functions by pointing and clicking on any key or button listed on the display area.

User Safety

In this manual, two labels identify potentially dangerous or destructive conditions or procedures:



The WARNING label identifies conditions or practices that may present danger to the patient and/ or user.



The CAUTION label identifies conditions or practices that could damage the equipment or cause you to lose data.

A third label, NOTES, helps you identify areas of possible confusion and avoid potential problems during system operation.



IMPORTANT!

Please read and follow all WARNINGS, CAUTIONS and NOTES provided in this guide. To avoid the possibility of injury, damage to your TruScan or lost data, observe these safety precautions during system operation and maintenance. For your information, the WARNINGS and CAUTIONS provided in this manual are listed on the following pages.

User and System Warnings:

Connect patient electrodes to fully electrically-isolated physiological devices only. Connection of patient electrodes to any other devices or external electrical outlets may result in personal injury.

Do not operate the device in close proximity (i.e., less than 1 meter) to a shortwave or microwave therapy device. This practice may lead to electromagnetic interference into the electrode leads and can cause patient burns.

Using electrodes with current densities greater than 2 mA r.m.s./cm² may require the special attention of the operator.

This device is not suitable for use in the presence of a flammable anesthetic mixture with air, or in the presence of a flammable anesthetic mixture with oxygen or nitrous oxide.



CAUTIONS

Caution: *Proper use of this device depends on careful reading of all instructions and labels.*

Caution: *Rx Only. Federal law restricts this device to sale by or on the order of a licensed health professional.*

Caution: *EU Only: All non-medical equipment connected to this device, such as printers, must comply with IEC900 and/or all European Directives. All non-medical devices must be connected to a medical use certified Isolated Power Supply.*

Preventive Maintenance

Preventive maintenance for the Deymed TruScan Neurofeedback system consists of periodically cleaning and visually inspecting the exterior of the instrument. Deymed Diagnostic recommends that the typical user follow the preventive maintenance schedule presented in TruScan Neurofeedback Service Manual. Your own schedule may vary based on the type and amount of instrument use.

Additional Copies

Additional copies of this user guide and/or other Deymed Diagnostic literature may be obtained from:

Deymed Diagnostic USA
1720 N. 7th Ave
Payette, ID 83661
Phone: 1-208-642-9300
Fax: 1-212-504-3290

Connecting the Electrodes

Connecting the Electrodes

The following instructions explain how to connect the recording electrodes to the appropriate TruScan Neurofeedback system components.

Position the electrodes on your patient according to your own conventions.

Recording Electrodes:

- Position the recording electrodes on the patient or place the FlexiCap recording cap on the patient.
- If using individual electrodes, connect them to the amplifier as described in the 'Individual Electrodes Connection to TruScan Neurofeedback inputs' chart below.
- When using 9mm disc electrodes with touch proof connectors, plug the touch-proof connectors into the corresponding openings with the pins on the front of the amplifier.
- When using the FlexiCap recording cap, plug the cap 25 pin connector into the CAP connector 'Canon 25f' connector on the TruScan Headbox.

Individual Electrodes Connection to TruScan Neurofeedback inputs

Electrode	Amplifier Channel Connector
Patient Ground	Green 'PG' pin jack
Reference Channel	Purple 'REF' pin jack
Active Channels	Red,Light Blue and Orange pin jacks

Basic Steps for Recording

Patient Hookup with Recording Cap

1. Scrub the patient's ears and forehead with Nuprep and wipe off with an alcohol swab.
2. Measure the circumference of the patient's head in order to choose the right recording cap:
Green(47-51 cm)
Yellow(51-55 cm)
Red(54-58 cm)
Blue(59-63 cm)
3. Put the cap on the patient's head with the tag in the back.
 - Make sure FZ, CZ, PZ are centered
 - Make sure that CZ lines up with the ears
4. If using ear electrodes, place tin ear clip electrodes, filled with gel, onto the patient's ears
5. If using ear electrodes, plug ear electrodes into ear sockets in cap, or if cap does not have ear connectors, plug into A1 and A2 sockets on Headbox.
6. If the recording cap is not a Deymed brand cap, place a ground electrode, filled with paste, onto the patient's forehead, in the center of FP1 and FP2, and plug the electrode into the green 'PG' slot on the TruScan Headbox.
7. Plug the cap into the Headbox via the 25 pin connector, preferably using the included wear and tear extension cable to protect the Headbox connector from overuse.
8. Put gel into every hole in the cap but be careful not to overfill. If gel runs down from one electrode to the other, they will short (create a bridge between the two electrodes) and the signal be the same at both locations.
9. Check the impedances, including the ground, are below 10Kohm or show as Blue or Green on the impedance display. If any channel is not showing Blue or Green, then the connection is most likely not low enough and precaution should be taken to further lower the impedance. TIP: take the end of the wooden Q-tip and twist around in the corresponding hole on the cap for the problem electrode. You can also add more gel if necessary being careful not to overfill.

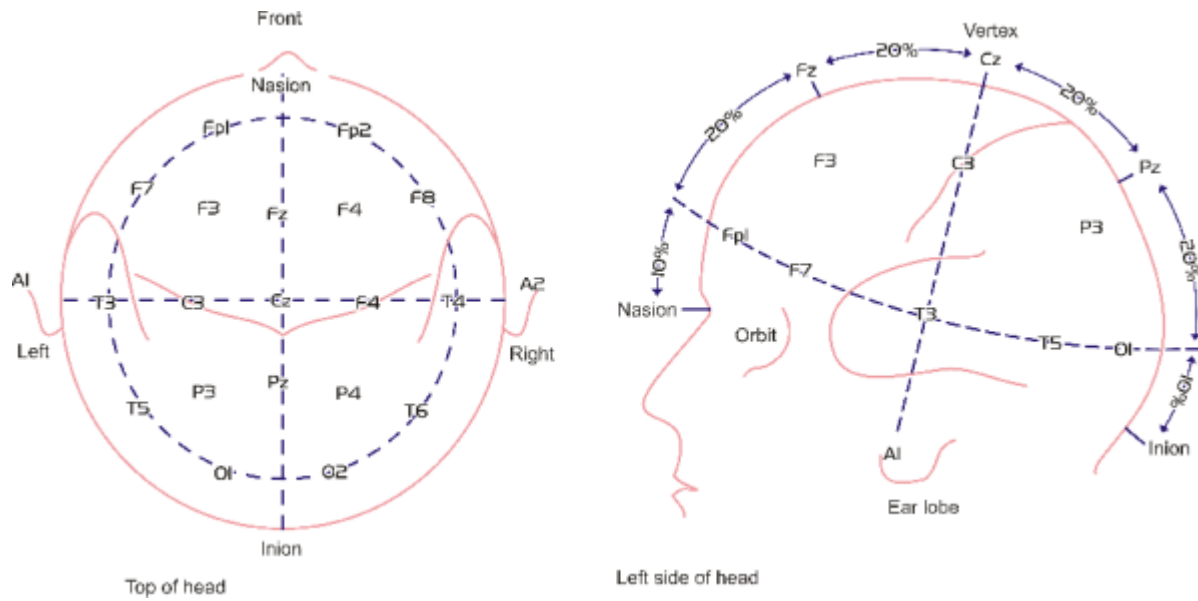
Setup of Patient for Training or Recording

1. From the Edit Patient's Card tab, add a new patient. Fill in the name fields. Give the patient an ID number. The number can not include Alpha characters or spaces or other non-numeric characters.
2. Set the montage to the preferred montage* (on the left side on the screen next to the record and stop buttons). During patient preparation, the REF montage is preferred due to the ability to see each active channel individually to the Hardware reference channel.

3. Set the sensitivity to 70 μ V to start if not set to that value. You may reduce or increase this setting during recording or training to facilitate a better visualization of the brainwaves. Note that this setting does not affect the actual stored data.
4. Hit 'Record' when the patient is ready with clean signal that is mostly free of large EMG or other signal artifacts.
5. During the recording or training, look for EMG or movement artifact in the recording and if necessary pause and coach the patient to remove this artifact.
6. After desired amount of training or recording minutes, hit the 'Stop' button (located below the Pause button).
7. The Patient may now be disconnected and cleaned up. You may now exit the TruScan software.

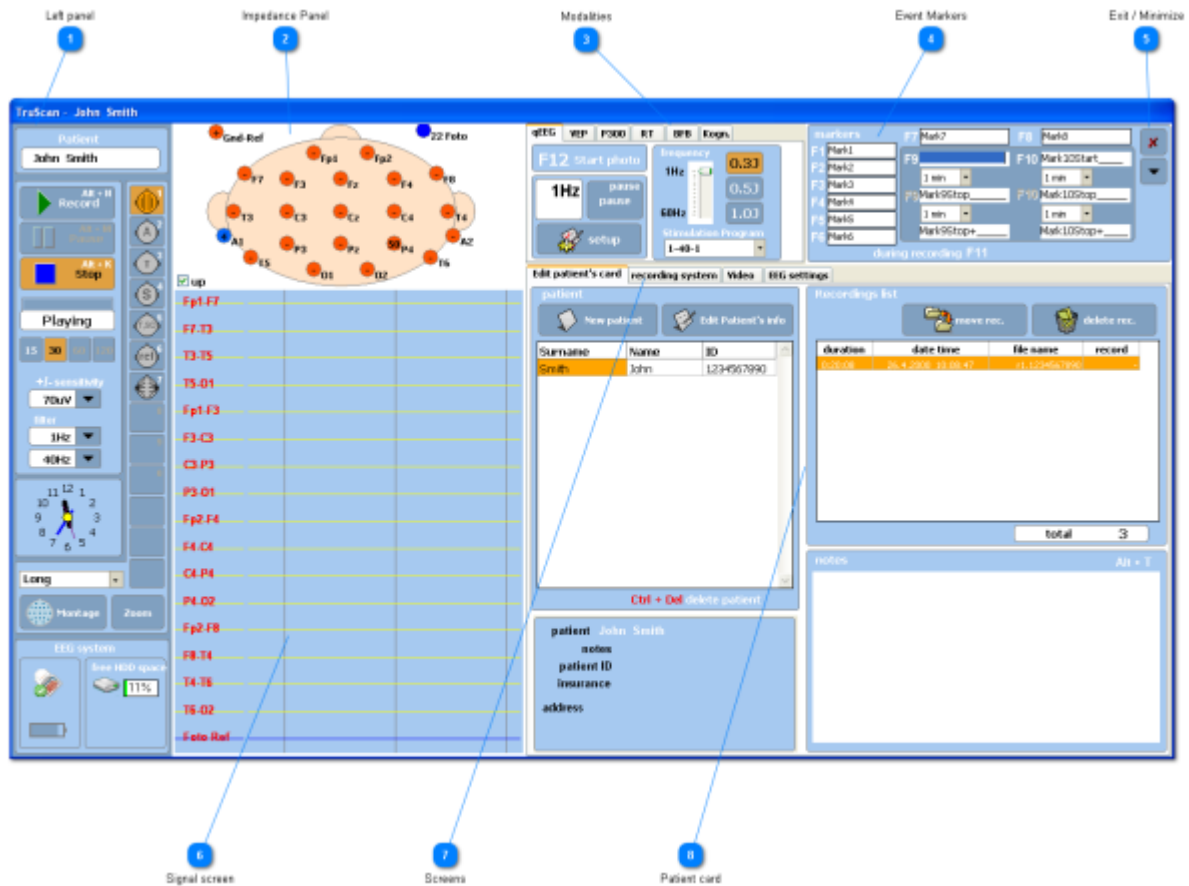
* The Montage selection is only for viewing purposes. You can change the Montage at any time during or after the recording with no change or affect to the recorded data.

Electrode placement according to 10/20 system



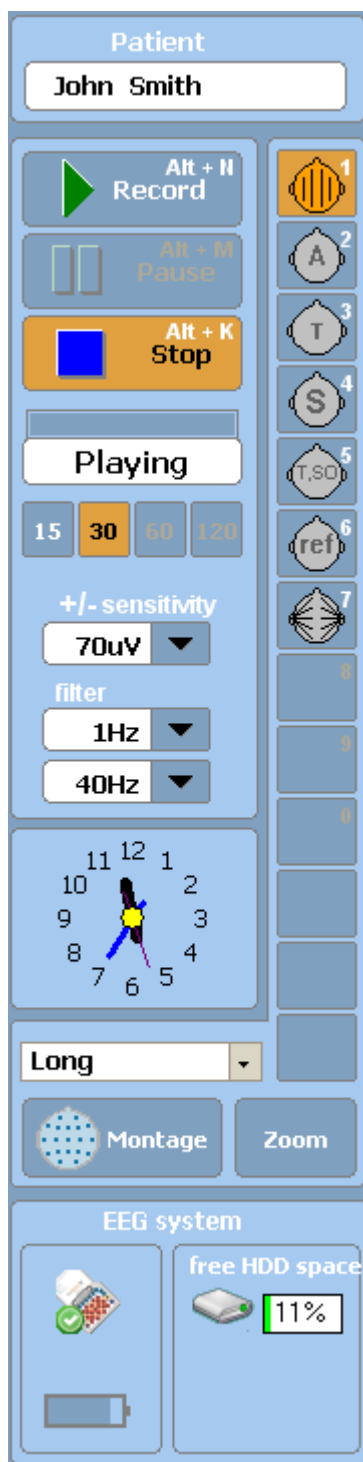
MAIN INTERFACE CONTROLS

TruScan Acquisition overview



1

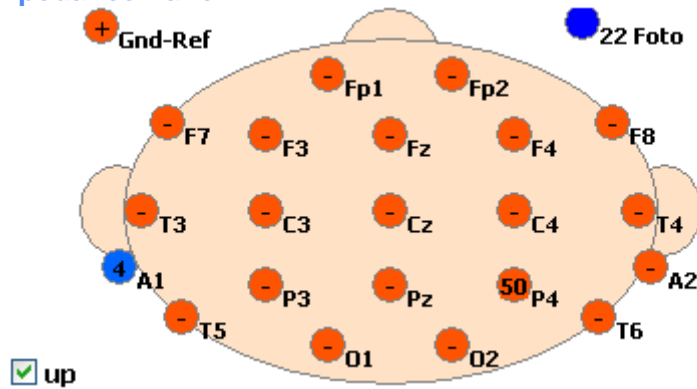
Left panel



In the left panel, a user can control the recording and change recording settings. The controls include the record, pause and stop button. Other control or settings buttons include the timebase, sensitivity, filters and montage controls. All of these recording settings however do not affect the actual recorded signal if changed during recording. All signal is recorded to its full bandwidth according to the sample rate set on the 'Recording System' page. The number of channels recorded is also set on the 'Recording System'

For more in depth details on this panel go to [Left panel](#) section of this user manual.

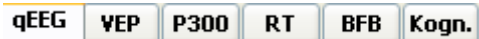
Impedance Panel



Blue	< 5 kOhms	High Quality Connection (very low impedance)
Green	5 kOhms to 10 kOhms	Good Connection
Yellow	11 kOhms to 30 kOhms	Poor Connection
Red	> 30 kOhms	Unusable connection or electrode disconnected

1. Using a Q-Tip, remove bubbles in the gel inside the electrode, by gently inserting the wooden end and twisting.
2. Grab the electrode body between finger and thumb and massage in a circular motion to remove hair from under the electrode.
3. Check the Ground and Reference electrodes as these affect the impedance for every electrode. The Reference electrode is built into the cap at FPz, but does not have it's own readout on the Impedance Meter.
4. Add more gel to ensure a good connection. Too much gel can short electrodes together reducing the signal from both sites.

Modalities



The modalities panel allows the user to select from a set of various functions or additional tests available in the TruScan Acquisition program.

You can find more details on each individual test or program here :

qEEG

[BFB](#)

[Cognitive Markers](#)

4

Event Markers

 The screenshot shows the 'Event Markers' window. On the left, there is a list of markers F1 through F6, each with a text input field containing 'Mark1' through 'Mark6'. To the right, there are two columns of controls for F7 and F8. F7 has a text input 'Mark7' and a dropdown menu set to '1 min'. F8 has a text input 'Mark8' and a dropdown menu set to '1 min'. Below these, there are controls for F9 and F10. F9 has a text input 'Mark9Stop', a dropdown menu set to '1 min', and a text input 'Mark9Stop+'. F10 has a text input 'Mark10Start', a dropdown menu set to '1 min', and a text input 'Mark10Stop+'. At the bottom of the window, there is a status bar that says 'during recording F11'.

For more details go to [Event Markers](#)

5

Exit / Minimize



Exit Button:

Used to exit the program, and shut down the Headbox.

Minimize:

Minimize the TruScan to a system taskbar.

6

Signal screen

Fp1-F7			
F7-T3			
T3-T5			
T5-O1			
Fp1-F3			
F3-C3			
C3-P3			
P3-O1			
Fp2-F4			
F4-C4			
C4-P4			
P4-O2			
Fp2-F8			
F8-T4			
T4-T6			
T6-O2			
Foto Ref			

This is the main signal screen where the signal will appear. The channel configuration is set by the selected montage. In TruScan Acquisition, there will be yellow lines in place of signal if the impedances are not below 50 KOhm. This helps prevent users from mistaking noise as real signal in the event that any electrodes lose contact during recording. There is an option to turn off this impedance check with yellow lines in the recording system tab.

7

Screens

Edit patient's card recording system Video EEG settings

For more details go to the following sections in this user manual:

[Edit patient's card](#)

[Recording system](#)

[EEG settings](#)

8

Patient card

The interface is divided into three main sections: a patient management area on the left, a recordings list on the top right, and a notes section on the bottom right.

patient section: Includes buttons for "New patient" and "Edit Patient's info". Below these is a table with columns "Surname", "Name", and "ID".

Surname	Name	ID
Smith	John	1234567890

Below the table is a large empty text area. At the bottom of this section is a red text prompt: "Ctrl + Del delete patient".

Below the text area is a list of fields for patient information:

- patient John Smith
- notes
- patient ID
- insurance
- address

Recordings list section: Includes buttons for "move rec." and "delete rec.". Below these is a table with columns "duration", "date time", "file name", and "record".

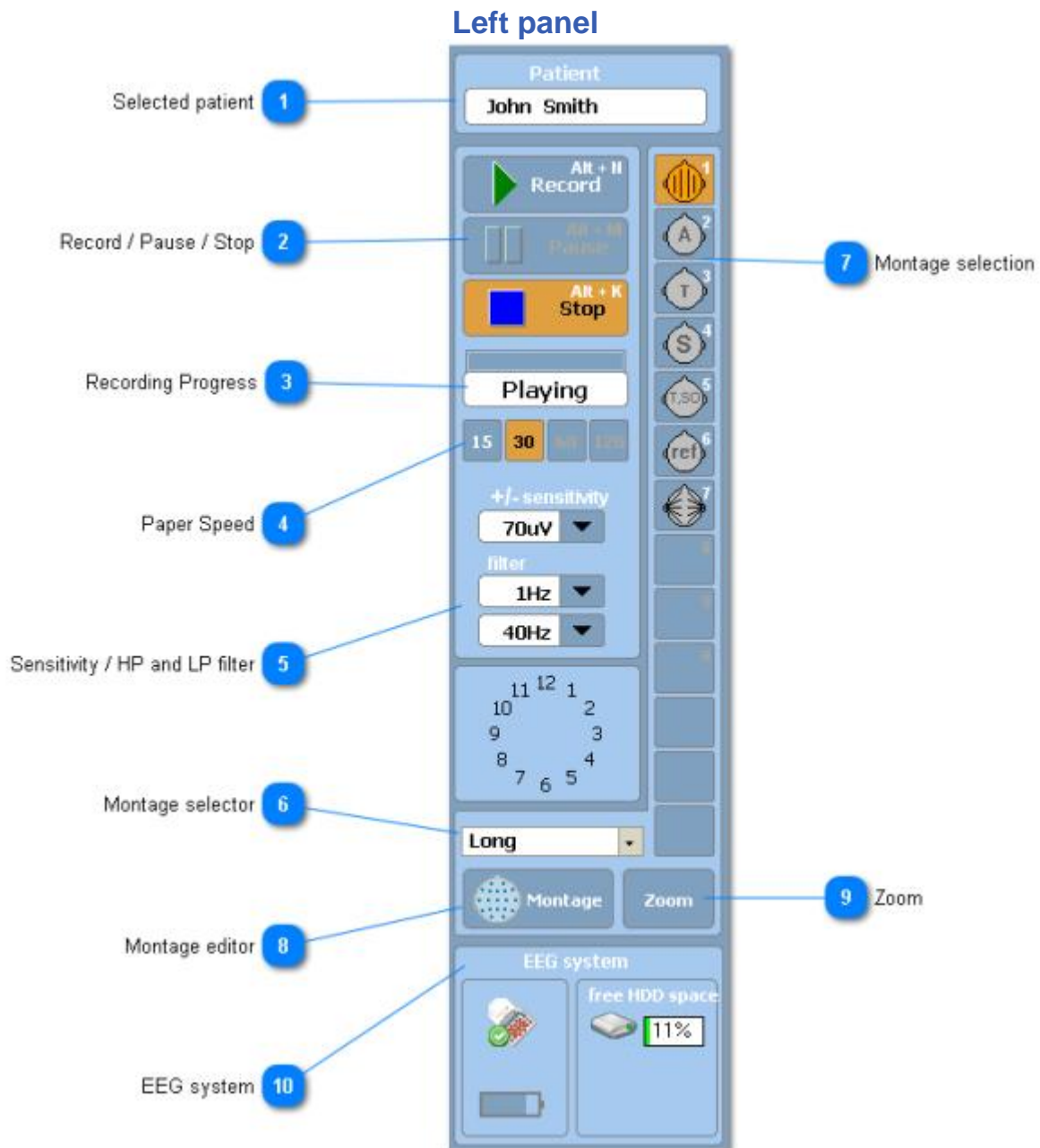
duration	date time	file name	record
0:20:08	26.4.2000 10:08:47	r1.1234567890	-

Below the table is a "total" label with the value "3".

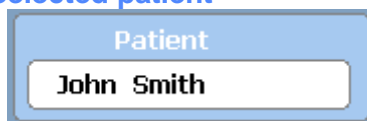
notes section: A large empty text area for notes, with a keyboard shortcut "Alt + T" indicated in the top right corner.

the patient card area allows the user to input patients into the database or easily search the database for existing patients. There is also a recordings list and notes section.

For more details go to [Patient card](#).



1 **Selected patient**



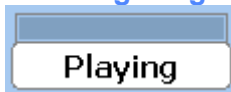
This area displays the currently selected patient for recording.

2

Record / Pause / Stop

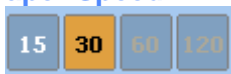
From here the recording can be Started, Paused and Stopped. When using the pause button, and then resuming the recording by hitting the Record button again, the recording is still the same file. If the user clicks on the 'Stop' button this will end the recorded file. The user may pause and continue the recording as many times as they wish.

3

Recording Progress

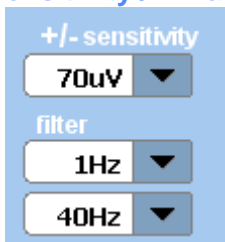
This area displays the recording status. During recording the message 'Recording' will be displayed. If the recording has stopped, the message 'Stopped' will be displayed. If the recording is paused the message 'Paused' will be displayed.

4

Paper Speed

Legacy measurement of the speed at which the signal traverses the screen. Speeds of 15, 30, 60 and 120mm/sec are available. 30mm is Default.

5

Sensitivity / HP and LP filter**Sensitivity:**

Sets the sensitivity of the signal displayed. Sensitivity is adjustable from 20 μ V to 999 μ V. A default of 70 μ V is used. A setting of 70 μ V should be set to give a clear reading of each

of the recording channels being used. Adjusting the sensitivity setting has no effect on the signal that is recorded to the hard disk.

Highpass Filter:

This sets the cut-off for the highpass filter of the signal readout. Frequencies under this setting will not be displayed. This default setting is 0.5 Hz but no highpass setting will affect the recorded signal.

Lowpass Filter:

This sets the cutoff for the lowpass filter of the signal readout. Frequencies above this setting will not be displayed. This is normally set to 35 Hz but no lowpass setting will affect the recorded signal.

6

Montage selector

Pre-set montages are selectable by icon or by this drop-down menu. If an icon has not been set for a montage the name of the montage will always be listed in this drop-down menu.

7

Montage selection

Pre-set montages are selectable by clicking on its icon or via the drop-down menu. Each montage may also be selected by clicking on the corresponding number displayed in the top right-hand corner of the montage icon.

8

Montage editor

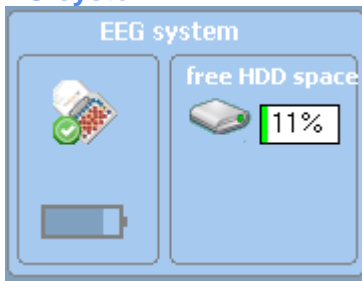
Montages can be created or edited in this section.

9

Zoom

Toggles the wide-screen view of the signal display.

10

EEG system**Hard Drive Free space:**

Shows the amount of free space on the currently selected drive.

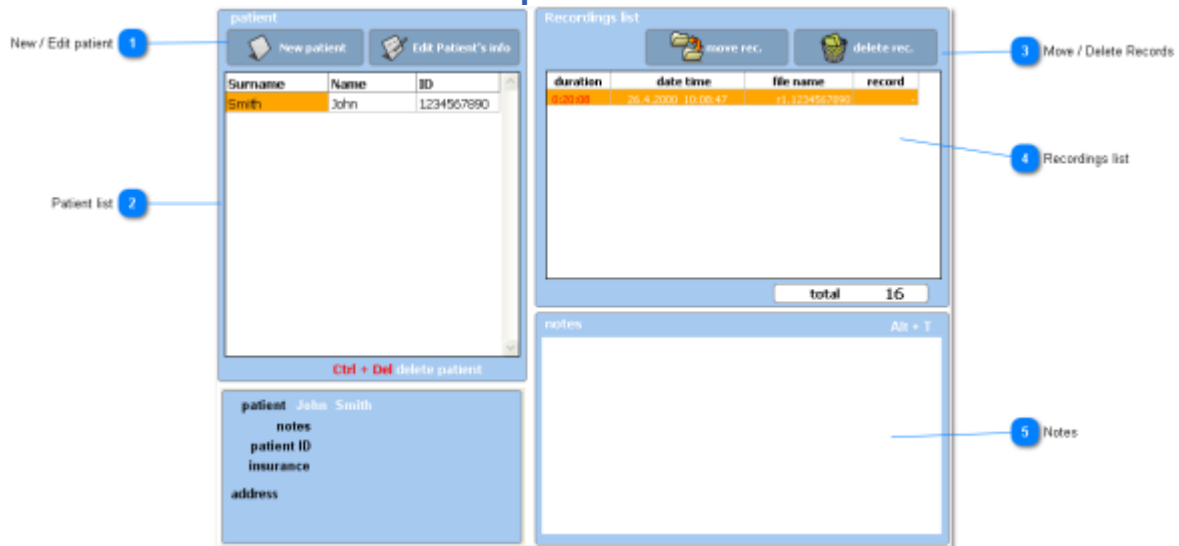
Battery Condition:

Shows the battery condition of the device. The battery should last for up to at least 120 hours of continuous recording. Even a low battery state will not affect the recording. It is recommended to recharge the battery, however, any time the battery is below 10% charge. A full recharge the battery should not be more than four hours. When the battery is charging, it may take up to one or two hours before the LED light will start blinking again on the headbox, which is normal

Headbox icon:

The headbox icon shows a green checkbox next to the icon when the system can detect and communicate with the headbox. If the green checkbox is not visible, the system is not connected correctly and you will not be able to record. You may double-click on this icon to reboot the headbox.

Edit patient's card



1

New / Edit patient



New Patient button:

Opens the "Work with Patient's Data" dialogue box to enter a new patient.

Edit Patient's Card button:

Opens the "Work with Patient's Data" dialogue box for the currently selected patient.

2

Patient list

Surname	Name	ID
Smith	John	1234567890

Ctrl + Del delete patient

Shows the current patients in the system sorted alphabetically, ascending by surname.

Searching the Patient database:

Search the patient database, by clicking the column that you would like to search and start typing. The results will sort based on what you type, allowing you to quickly find the patient you are looking for. At the bottom of this window you will see the letters or characters as you're typing them. To correct your typing, you may use the Backspace.

3

Move / Delete Records**Move Rec. button:**

Opens the “Move Record” dialogue box. This dialog box allows you to move a recording to a new patient in the event that a recording was made on the wrong patient name.

Delete Rec. button:

Opens the “Delete Files” dialogue box. This dialog will allow you to delete recordings but only after a series of confirmations to be sure no file is accidentally deleted.

4

Recordings list

duration	date time	file name	record
0:20:08	26.4.2000 10:08:47	r1.1234567890	-

Shows the recordings available in the system for the currently selected patient. the columns include duration, indicating the length of recording, the date and time of the recording, the file name of the recording and the type of record. The type of record may be EEG or BFB depending on which modality tab is selected at the time of recording.

5

Notes

notes Alt + T

Use this for general notes for each recording. Notes typed here are specific to each recording. the notes entered here will also be available in the interpretation editor in TruScan Explorer.

Create / Edit Patient's data

Work with patient's data

Patient card 1

Patient details 2

OK / Cancel 3

1

Patient card

Patient:

Surname:

Name:

ID:

Address:

Street:

City:

ZIP Code:

Phone:

Birth date: Day: Month: Year:

Height:

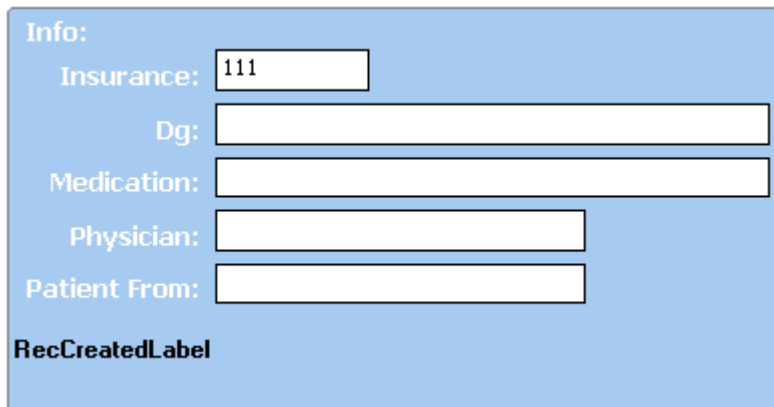
Weight:

Sex: ▼

Handedness: ▼

Insert patient Name and Identification number. Only a Name and patient ID is required to create new patient card. The patient ID will be automatically populated by the system, but the user may choose to edit this field with a different ID number. An ID number cannot be duplicated in the system. The ID number may not contain characters or spaces.

2

Patient details

A light blue rectangular form with a thin black border. Inside, the text 'Info:' is at the top left. Below it are five input fields: 'Insurance:' with the value '111', 'Dg:', 'Medication:', 'Physician:', and 'Patient From:'. At the bottom left of the form is the text 'RecCreatedLabel'.

Use this area to add patient's insurance number, his/her physician, notes and type of medication. The referring doctor or department may also be included.

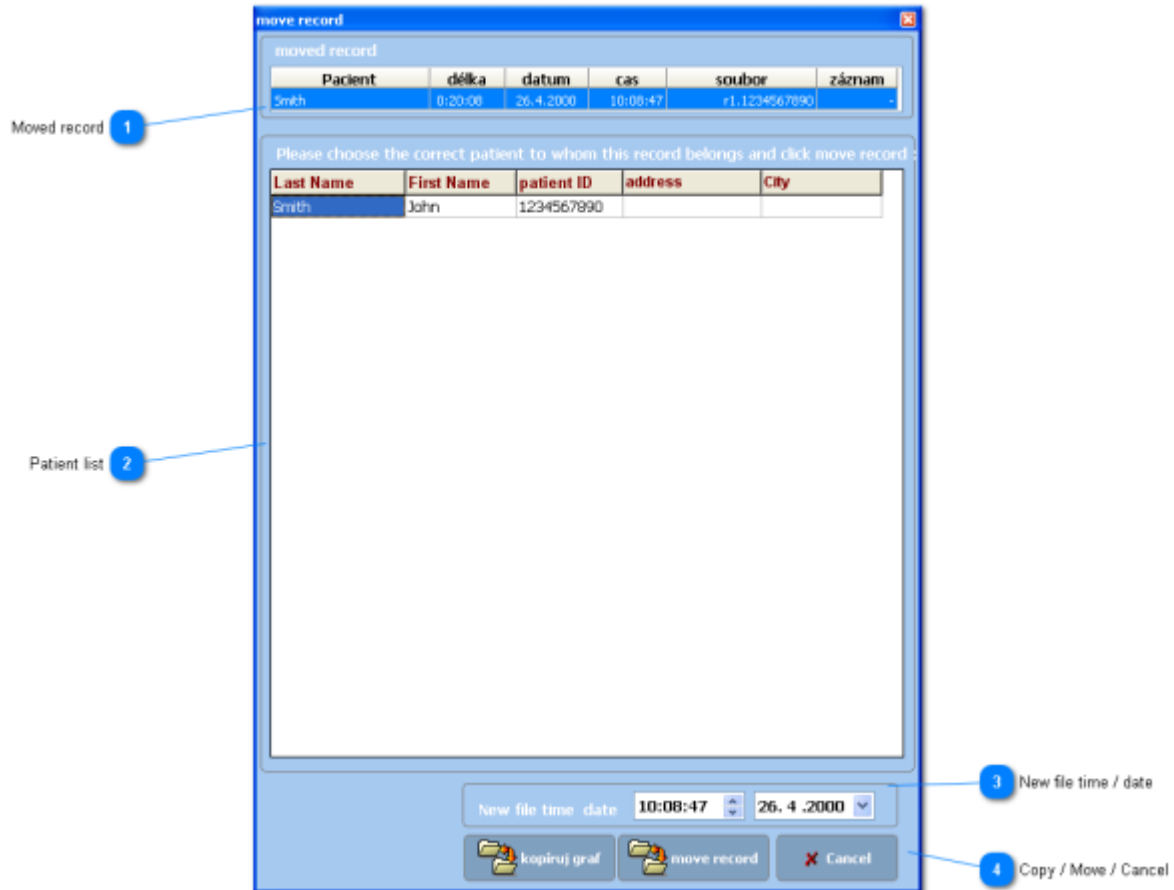
3

OK / Cancel

A light blue rectangular box containing two gray buttons with black text. The left button is labeled 'OK' and the right button is labeled 'Cancel'.

Click okay to save any changes or cancel to leave without saving changes.

Move Records screen



1 Moved record

moved record					
Pacient	délka	datum	cas	soubor	záznam
Smith	0:20:08	26.4.2000	10:08:47	r1.1234567890	-

This area indicates what signal recording is being moved.

2 Patient list

Please choose the correct patient to whom this record belongs and click move record :

Last Name	First Name	patient ID	address	City
Smith	John	1234567890		

3

New file time / date

New file time date 10:08:47 26. 4 .2000

The new file time and date dialog allows you to change the date and recording time of the recording in the event that the settings were wrong during acquisition.

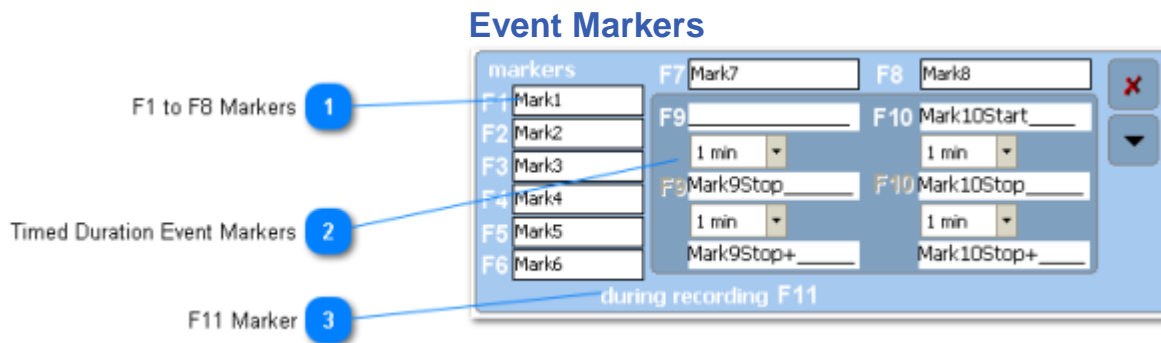
4

Copy / Move / Cancel

 kopíruj graf  move record  Cancel

The copy move or cancel dialog allow the user to copy or move the selected file. If the user wishes to quit the operation without moving or copying the file he can choose

cancel.



1

F1 to F8 Markers

markers	
F1	Mark1
F2	Mark2
F3	Mark3
F4	Mark4
F5	Mark5
F6	Mark6

It is possible to pre-define event markers for buttons F1 through F8. Click on the area next to the button you wish to set, and type the event description (i.e. eye blink). During recording the user can click on the corresponding function key from the computer keyboard to insert marker or click on the function key in the software interface via the mouse to insert the marker.

2

Timed Duration Event Markers

F9	Mark10Start
1 min	1 min
F9 Mark9Stop	F10 Mark10Stop
1 min	1 min
Mark9Stop+	Mark10Stop+

The time and duration event markers are used to insert start and stop markers for a defined time interval. The marker names for the start and stop positions can be designated as well as the amount of time via the drop-down menu. A final marker may be also placed after a set duration occurring after the first stop marker. This marker is sometimes referred to as the stop+ marker.

These timed events are displayed in the TruScan Explorer review by highlighting the signal in between these intervals.

**F11 Marker**

The F11 Marker allows the user to insert any random text during the recording. Once this button is pressed the user may type any text and have that text inserted at the time that the button was first pressed, regardless of how long it takes to type the event or note.

Kognitive Marker

Block Markers

1

2

Notes

The screenshot shows a software window titled "Kognitive Marker". It is divided into two main sections: "Block markers" on the left and "Notes" on the right. The "Block markers" section contains a list of four items, each with a colored icon (green checkmark, red X, red X, red X) and a text input field. The "Notes" section has a large text area for writing. Above the "Notes" text area are two buttons labeled "add" and "del".

1

Block Markers

This close-up shows the "Block markers" section of the interface. It features a header "Block markers" followed by a list of four items. Each item consists of a small square icon (green checkmark, red X, red X, red X) and a text input field.

2

Notes

This close-up shows the "Notes" section of the interface. It features a header "Notes" followed by two buttons labeled "add" and "del", and a large text area for writing.

RECORDING SYSTEM

Recording System Tab

Recording systems Custom recording system Custom recording system creator

1 2 3

System 10/20

System 10/20, EKG, Poly

System 10/20 + 32QEEG

PSG

number electrode 18

El	name
1	Thorax
2	Abdom
3	AFlow
4	Snore
5	ECG
6	EOGR
7	EOGL
8	Chin
9	LegR
10	LegL
11	Body
12	C3
13	C4
14	O1
15	O2
16	A1
17	A2
18	ScO2

Data format

0.1 - 52Hz bandwidth (128Hz data rate)

0.1 - 102Hz bandwidth (256Hz data rate)

0.1 - 460Hz bandwidth (1024Hz data rate)

Headbox 1

Headbox 2

Calibration

impedance check

Recording date 12.1.2012

Recording time 18:13:52

Use

4 5 6 7

Data format Headbox activator Calibration / Impedance check Change recording date / time

1

Recording systems

System 10/20

System 10/20, EKG, Poly

System 10/20 + 32QEEG

The recording systems that are offered by default in the system are shown here. The recording system dictates what channels are recorded and the label name for each channel. The three standard recording systems are displayed, with an additional drop-down menu that shows some additional recording systems. These recording systems are permanent and cannot be changed.

2

Custom recording system

Channel Number	Channel Name
1	Thorax
2	Abdomn
3	AFlow
4	Snore
5	ECG
6	EOGR
7	EOGL
8	Chin
9	LegR
10	LegL
11	Body
12	C3
13	C4
14	O1
15	O2
16	A1
17	A2
18	SpO2

The user may add and customize as many recording systems as they like in this area. To save a new recording system, the user can type a name in the top left-hand area, set the number of electrodes, name the electrodes according to the channel number, and then click the save button (the wrench and hammer button).

3

Custom recording system creator

El	name
1	Thorax
2	Abdom
3	AFlow
4	Snore
5	ECG
6	EOGR
7	EOGL
8	Chin
9	LeaR
10	LeaL
11	Body
12	C3
13	C4
14	O1
15	O2
16	A1
17	A2
18	SpO2

When creating custom recording system options, you have the ability to name the electrodes by selecting and editing the electrode names in this column.

4

Data format

Data format

☒ **0.1 - 52Hz bandwidth (128Hz data rate)**

☐ **0.1 - 102Hz bandwidth (256Hz data rate)**

☐ **0.1 - 460Hz bandwidth (1024Hz data rate)**

The TruScan Neurofeedback system always records with a sample rate of 4096 Hz but the data saved to the hard disk is lowered to a more manageable size with the help of a DSP processor. The data format or saved data rate can be set in this area. Due to the DSP optimization, a stored sample rate of 128 Hz will provide a bandwidth up to 52 Hz. With a data sample store rate of 256 Hz, the bandwidth goes up to 102 Hz. with a sampling stored data rate of 1024 Hz, the bandwidth goes up to 460 Hz. This is the maximum stored bandwidth available.

By default the system uses the 128 Hz sample store rate.

5

Headbox activator

☒ **Headbox 1**
☐ **Headbox 2**

The TruScan Acquisition software can handle up to two had boxes simultaneously. They

can both be turned on at the same time or each one individually. This allows for up to 64 channels using two 32 channel headboxes.

6

Calibration / Impedance check



Impedance check:

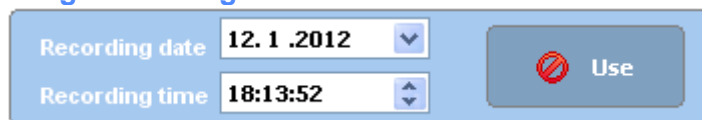
When this button is pressed, any signal above 50 kOhms is shown as straight yellow lines. This is the default setting. When this button is not pressed, any signal or noise entering the amplifier inputs will be displayed regardless of the impedance. The purpose of this feature is to help prevent the user from mistaking a badly connected electrode as giving good signal, thus the yellow lines are displayed to show the user that the impedance is too high to give a good signal.

Calibration:

The calibration button when selected inputs an 8 Hz square wave into all input channels of the system. This can be used to ensure that the amplifier is properly calibrated.

7

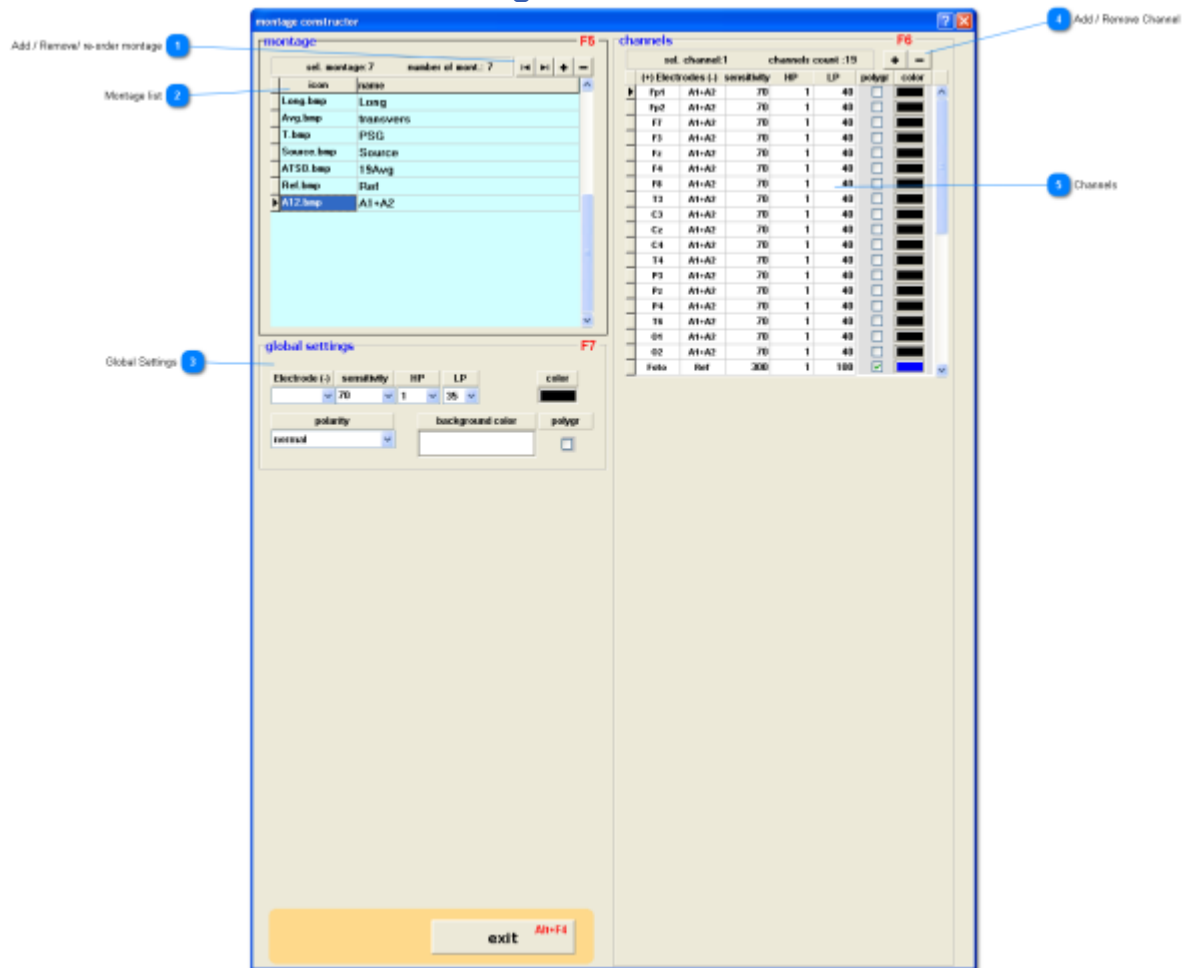
Change recording date / time



The change recording date and time settings can be used to change the date and time of the recorded data instead of using the date and time of the Windows operating system.

MONTAGE EDITOR

Montage Editor Screen



2

Montage list

icon	name
Long.bmp	Long
Avg.bmp	transvers
T.bmp	PSG
Source.bmp	Source
ATS0.bmp	19Avg
Ref.bmp	Ref
▶ A12.bmp	A1+A2

Montage list shows two columns. The first column named 'icon' shows the name of the icon used to represent the montage on the main recording screen. There are preset icons in the system that can be used but any bitmap can be used as an icon as long as it is the same size as the current bitmap icons. The 'name' column shows the name of the montage. This name will be shown in the drop-down list when choosing montages.

3

Global Settings
global settings

F7

Electrode (-)	sensitivity	HP	LP	color
<input type="text" value=""/>	<input type="text" value="70"/>	<input type="text" value="1"/>	<input type="text" value="35"/>	<input type="text" value=""/>
polarity		background color		polygr
<input type="text" value="normal"/>		<input type="text" value=""/>		<input type="checkbox"/>

Global settings allow the user to quickly set all electrodes in a montage to the same value. This applies to the reference channel, sensitivity, high pass, low pass and polarity settings. The user may also globally set the color of the traces or designate the traces as polygraph channels. A polygraph channel is a channel that has fixed settings that do not change when the user changes global properties such as sensitivity or filters during recording.

4

Add / Remove Channel



The user may click on the plus or minus sign to add or remove a channel from the current montage.

5

Channels

	(+) Electrodes (-)	sensitivity	HP	LP	polygr	color	
▶	Fp1	A1+A2	70	1	40	<input type="checkbox"/>	
	Fp2	A1+A2	70	1	40	<input type="checkbox"/>	
	F7	A1+A2	70	1	40	<input type="checkbox"/>	
	F3	A1+A2	70	1	40	<input type="checkbox"/>	
	Fz	A1+A2	70	1	40	<input type="checkbox"/>	
	F4	A1+A2	70	1	40	<input type="checkbox"/>	
	F8	A1+A2	70	1	40	<input type="checkbox"/>	
	T3	A1+A2	70	1	40	<input type="checkbox"/>	
	C3	A1+A2	70	1	40	<input type="checkbox"/>	
	Cz	A1+A2	70	1	40	<input type="checkbox"/>	
	C4	A1+A2	70	1	40	<input type="checkbox"/>	
	T4	A1+A2	70	1	40	<input type="checkbox"/>	
	P3	A1+A2	70	1	40	<input type="checkbox"/>	
	Pz	A1+A2	70	1	40	<input type="checkbox"/>	
	P4	A1+A2	70	1	40	<input type="checkbox"/>	
	T6	A1+A2	70	1	40	<input type="checkbox"/>	
	O1	A1+A2	70	1	40	<input type="checkbox"/>	
	O2	A1+A2	70	1	40	<input type="checkbox"/>	
	Foto	Ref	300	1	100	<input checked="" type="checkbox"/>	

The channels area shows each channels settings including the active channel, the reference channel, sensitivity, high pass, low pass, polygraph and color settings. Any setting can be quickly changed by double-clicking in the cell and a drop-down menu or additional screen will show the options for that cell. To designate the channel to be a polygraph channel, meaning a non-EEG channel, just check the checkbox in the polygraph column.

create new montage window

Number of channels

Montage name

create montage

channels number 21 (1 - 128)

montage name new montage

OK Cancel

1

Number of channels

channels number 21 (1 - 128)

Select a number of channels to be included in your montage.

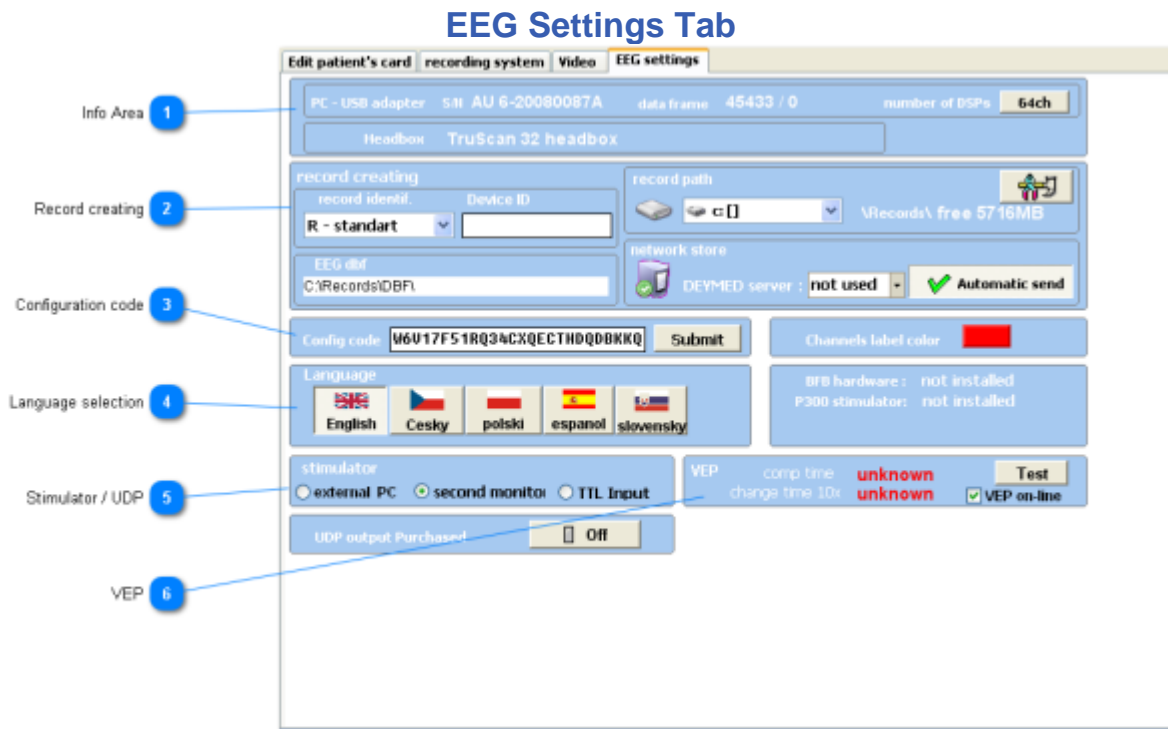
2

Montage name

montage name new montage

Choose the name of your new montage by editing this area to the name of your choice.

SETTINGS TAB



1

Info Area



The Info Area gives the following information:

PC-USB adapter: This is the Serial Number of the USB Adapter which is used when generating unlock codes for various TruScan features.

Data frame: This is used by a Deymed technician in case of troubleshooting the USB adapter. Users should not be concerned with this value.

Number of DSPs: This is used by a Deymed technician in case of troubleshooting the USB adapter. Users should not be concerned with this value.

Headbox: This is the name of the Headbox that is currently connected.

2

Record creating



Record Identifier:

set the letter that you want the record name to begin with;

EEG dbf:

Set the folder to which the patient database will be saved;

Record Path:

Set the folder to where the records will be saved;

Network Store:

When working with a network drive, set a folder where the records will be saved.

To save any changes, click the hammer/plier button

3

Configuration code




Config code

Type in a code to activate additional features such as Brainfeedback with 3D games, UDP output for Neuroguide or other Deymed features.

4

Language selection

Language

 English	 Cesky	 polski	 espanol	 slovensky
--	--	---	--	--

Choose a language for the program.

5

Stimulator / UDP

stimulator

☐ external PC ☒ second monitor ☐ TTL Input

UDP output Purchased

Stimulator: The Stimulator setting is used in scenarios for research VEP or P300. This is set with the help of a Deymed technician.

UDP output Purchased: This is used by a Deymed technician in case of troubleshooting the USB adapter. Users should not be concerned about this value.

6

VEP

VEP comp time **unknown**
change time 10x **unknown** ☒ VEP on-line

Test external VEP stimulator (external stimulator required). This setting is only to be used with the help of a Deymed technician.

MODALITIES (add-ons)

BRAINFEEDBACK

BrainFeedback Main Tab

The screenshot shows the BrainFeedback Main Tab interface. It includes a top navigation bar with tabs: qEEG, YEP, P300, RT, DFB, Kogn. Below this is a 'Training Settings' section (1) with fields for total rounds (4), round duration (3min), round pause (auto next), and averaging (3). There are also buttons for 'show relax' and 'show graph'. A '3D games' section (2) shows 'Demo' selected. A '2D games' section is also present. A 'Protocol/Sound/Band/LCC Window' (3) is on the left, showing a list of protocols: Alpha II, Alpha, Beta Delta, Beta Theta, and Smr. The main area displays a 'Spectrum' graph (4) with a 'Left' button. Below the graph are three monitoring windows: 'EEG REWARD' (1.0/- uV), 'EEG INHIBIT' (1.5/- uV), and 'ARTIFACT INHIBIT' (2.6/- uV). Each window has a 'MONITOR ONLY' button. A 'Main BFB Screen' (4) is indicated at the bottom right.

1

Training Settings

total rounds: 4, round duration: 3min, round pause: auto next, averaging: 3

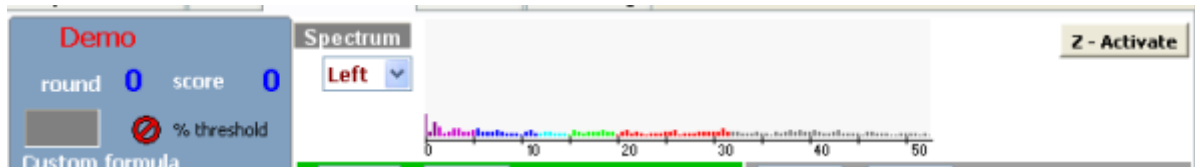
3D games: Demo, show relax, show graph

2D games:

For more information, see the [Training Settings](#) section of this user manual.

2

info screen/spectrum



For more information, see the [Info / Spectrum](#) section of this user manual.

3

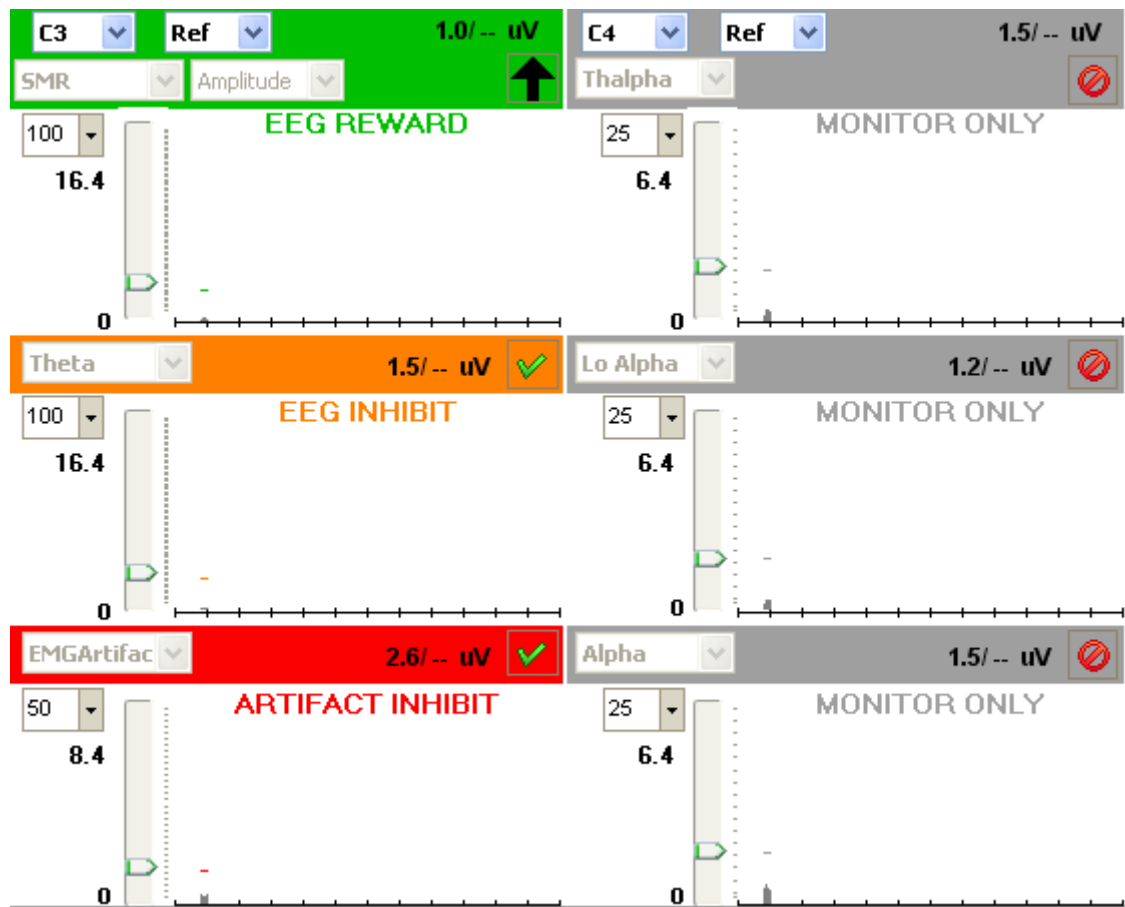
Protocol/Sound/Band/LCC Window



For more information, see the [BFB Protocols](#), [Sound](#), [Band](#) or [LCC Creator](#) section of this user manual.

4

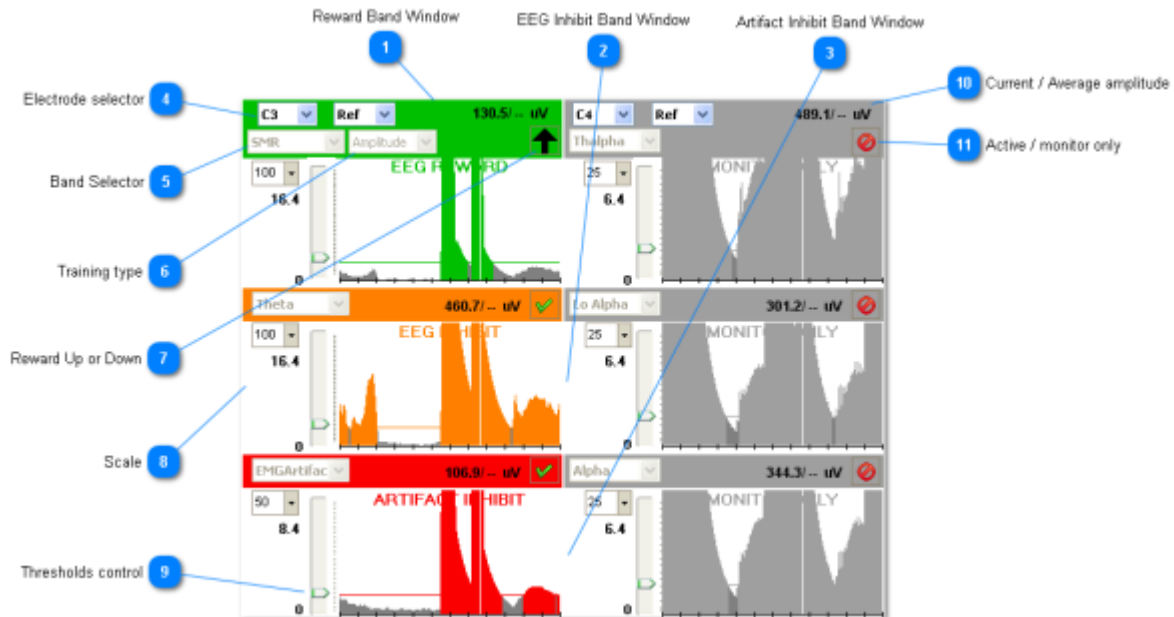
Main BFB Screen



For more information, see the [Main BFB Screen](#) section of this user manual.

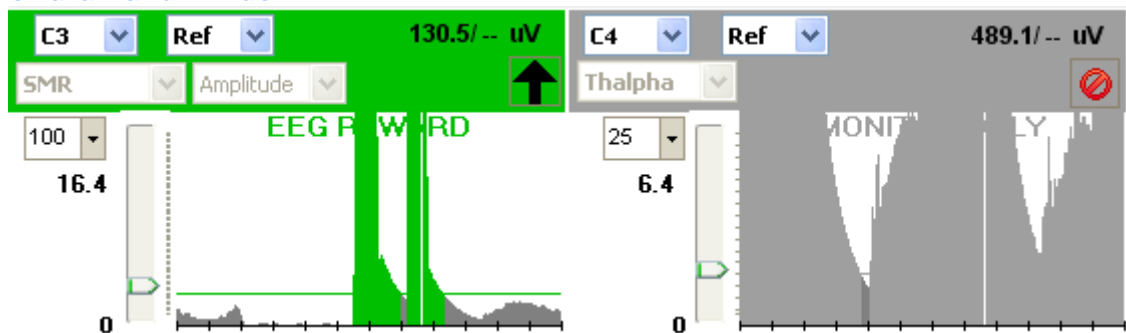
BFB Main controls

The BrainFeedback training screen is a unique single screen neurofeedback interface designed to make the use and control of neurofeedback sessions as easy as possible.



1

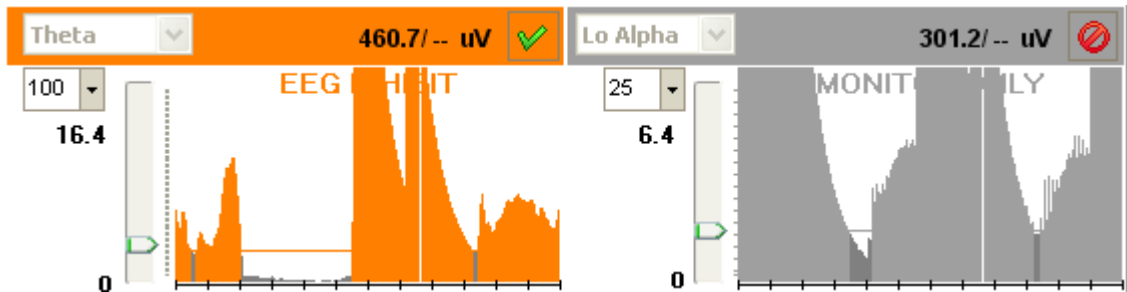
Reward Band Window



Up to two reward bands can be set, one for the left and right column. By default a single reward parameter is active, which is in the left column. The reward columns are easily identifiable by their green color. Each protocol settings window can use the same, or different electrodes and the same, or different Bands.

2

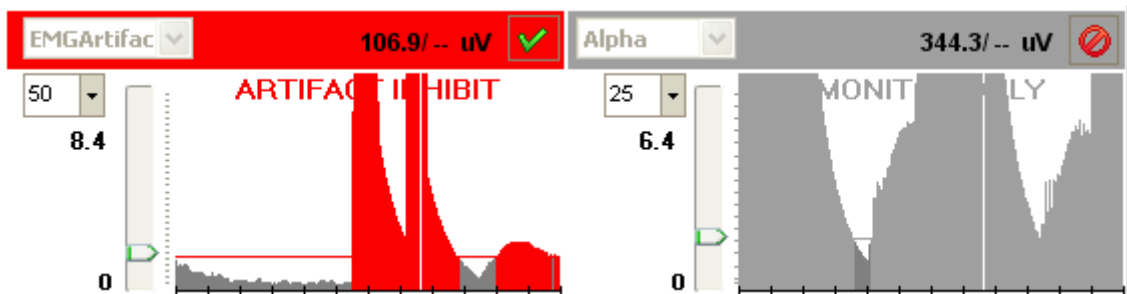
EEG Inhibit Band Window



The EEG inhibit band is colored orange and is used to inhibit any EEG band that the user sets. A second EEG inhibit band can be set by activating the additional EEG inhibit window to the right. Each protocol settings window can use the same, or different electrodes and the same, or different Bands.

3

Artifact Inhibit Band Window



The artifact inhibit band is colored red and is used to inhibit any EEG artifact band that the user sets. A second EEG Artifact inhibit band can be set by activating the additional EEG Artifact inhibit window to the right. Each protocol settings window can use the same, or different electrodes and the same, or different Bands.

4

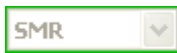
Electrode selector



The electrode selector designates the electrode montage used (from the drop-down menus) for the right or left column protocol window settings.

5

Band Selector



The band selector is used to designate the training band for the reward parameter. All bands that are created in the system are shown from this drop-down menu.

6

Training type



The training type menu shows the various types of biofeedback training that can be used.

Amplitude: Amplitude training is the most standard and basic training type where the protocol parameters are based on being above or below a set microvolt (uV) threshold.

Coherence: Coherence training is a type of training that rewards the user for increasing or decreasing the coherence between two EEG or LCC electrodes (between active and reference electrodes). The values are shown in percentages, with higher percentages being greater coherence and lower percentages being less coherent between the two electrode sites.

Z-Amplitude: Z-Score amplitude training uses the neuroguide Z score DLL to calculate real-time Z scores for the selected electrodes and bands. (the Z score training module is optional and must be purchased). Thresholds can be set to a maximum Z score value between plus and minus three. Only the reward band uses the instantaneous Z score values, and the EEG inhibit and EEG artifact channels are still based on standard amplitude microvolt values.

7

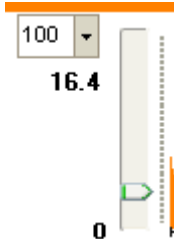
Reward Up or Down



The reward of up or down arrow can be toggled to indicate whether the goal of training should be to increase or decrease the activity in the reward band. In Z score training, this arrow should always be pointed down.

8

Scale



The scale area for each protocol window settings allows a user to adjust the threshold manually by dragging the control arrow up or down on the y-axis indicating the desired microvolt threshold. This can be set from 5 to 999 uV or from 0 to 100% in coherence training. In the Z score training, the Y axis is 0 to 3 indicating the maximum threshold for both the plus and minus Z score values on the same y-axis.

The drop-down menu at the top left of this screen allows the user to change the upper limit value for the protocol window. Typically this value is set to roughly double the value of the current activity for its window, thus allowing the user to have a better view of the data.

9

Thresholds control

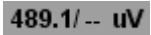


In each training window there is a threshold level control. The threshold level is set by either dragging the indicator with your mouse or with the keyboard up/down arrows. The user will typically set the threshold below the average microvolt value for reward, in

the case of up training, and and set the inhibit threshold slightly above the average micro vault value for inhibits.

10

Current / Average amplitude



Each protocol window displays the instantaneous and average microvolts values at the top right-hand corner of the window. The average is taken from the start of each round.

11

Active / monitor only



This button when turned on and is active, enables the protocol window to be an active part of the protocol. The protocol window will no longer be grayed out indicating the window is in use. When the window is not active, The activity will not be part of the protocol, but the values will be stored for monitoring purposes.

Training settings

The diagram shows the 'Training settings' window with four numbered callouts:

- 1 (Rounds):** Points to the 'total rounds' dropdown menu, which is set to 4.
- 2 (Averaging):** Points to the 'averaging' dropdown menu, which is set to 3.
- 3 (3D Games):** Points to the '3D games' section, which includes a dropdown menu set to 'Demo' and two disabled buttons: 'show relax' and 'show graph'.
- 4 (2D games):** Points to the '2D games' dropdown menu, which is currently empty.

Other visible settings include 'round duration' set to '3min' and 'round pause' with a disabled 'auto next' button.

1

Rounds

This section shows the 'total rounds' dropdown set to 4, 'round duration' set to 3min, and a disabled 'auto next' button.

Total rounds setting:

This setting determines how many rounds are in a session.

Round duration:

Define the duration of each round.

Auto next:

When selected, there will be a ten second pause at the end of each round and then the new round will start automatically.

2

Averaging

This section shows the 'averaging' dropdown menu set to 3.

Averaging is a method to fine tune the difficulty level of the training. To understand this setting it is important to know that a patient is rewarded when their amplitude is above

the reward threshold for at least one half second. Their amplitude is calculated 16 times per second, so this means that all 8 values (8 values per .5 second) must be above the threshold to get the point. These values need to be averaged due to the fact that EEG is highly erratic. The lower the number the less averaging, ie, with a lower number setting it becomes more difficult to score because there is less averaging (but the games are more reactive to the instantaneous movements of the EEG). Typically a value of 3 to 5 is generally used.

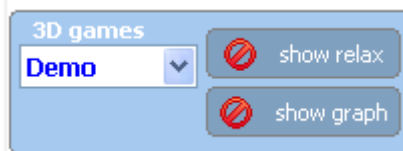
The scale works as follows.

1 is more reactive, sharp and jerky, more difficult to score

10 is less reactive, slow and lethargic, but easier to score

3

3D Games



3D Games selection:

List of 3D Games. After selecting the game from the drop-down menu it will show up on your monitor or on your second monitor if connected.

Show Relax:

When “show relax” is selected, a relax message will be displayed on the game screen when the artifact inhibit amplitude is above its threshold, indicating increased muscle or EOG activity (depending on the band set), which can interfere with the EEG measurements.

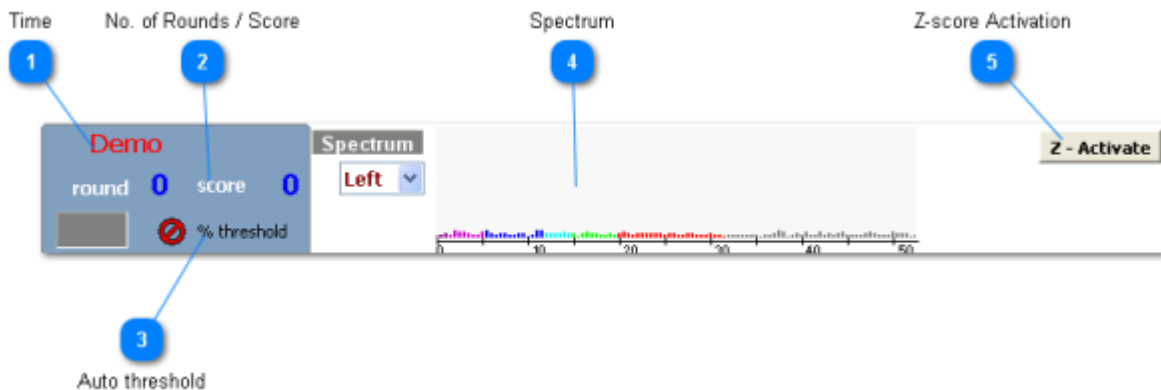
4

2D games



Used only for the 2 computer version of legacy 2D games.

Session Info / Spectrum



1

Time

Demo

Shows the actual time in the round. If the round has not been started, then this area will show the word 'Demo' meaning that the system is active but not recording.

2

No. of Rounds / Score

round 0 score 0

Rounds:

Shows the current round number.

Score:

Displays the score of the current round.

3

Auto threshold

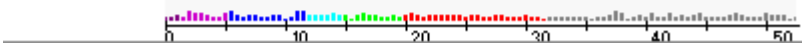
☒ % threshold

Auto or percent threshold activates the use of an automatic threshold calculation (based on a percentage setting) to determine the threshold for one of the training parameters, either reward, EEG inhibit or artifact reject parameter.

4

Spectrum

Spectrum
Left ▼



Displays the instantaneous amplitude spectrum from 0 to 50Hz. The electrode montage as set for the left or right group of training parameters is used. The user may choose the

right or left set of training parameters as the input for this display by clicking on the drop-down menu and choosing right or left.

5

Z-score Activation

A rectangular button with a thin black border and the text "Z - Activate" in a bold, sans-serif font.

In order to use Z score training, this module must be purchased and activated. Once a license is purchased the user can use the activate button to unlock this feature. Further instructions are shown once this dialogue is open.

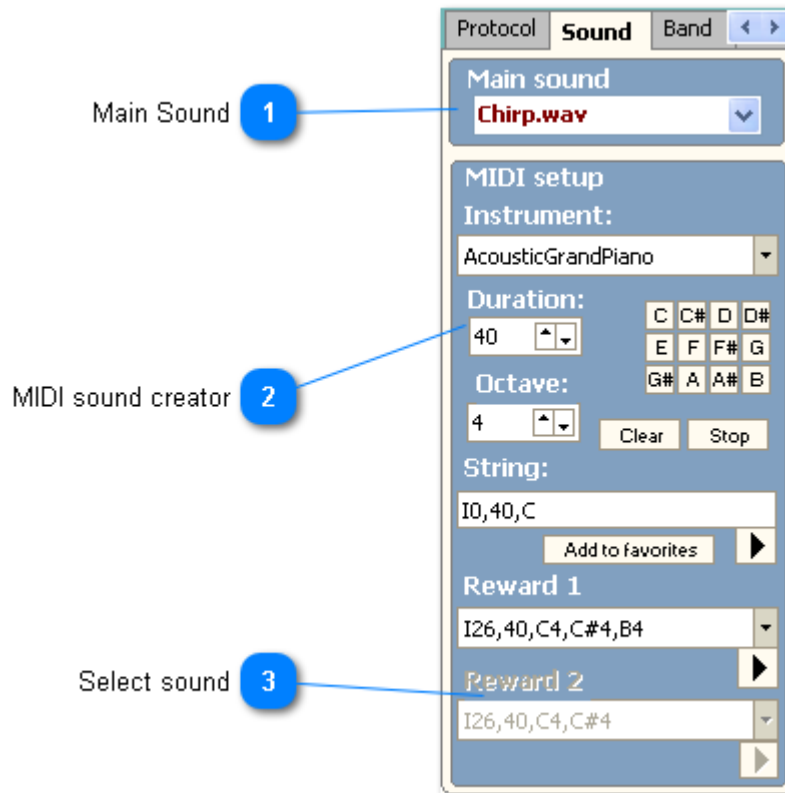


To create a new protocol click the new button. To edit any protocol select that protocol from the list and click edit. This will allow changes to be made to the protocol directly on the screen. To delete a protocol, select that protocol from the list and click on the delete button.



[illegible]

Sound



1

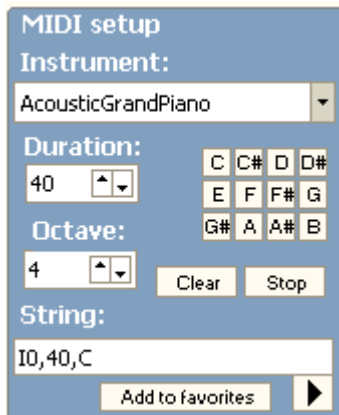
Main Sound



The main reward sound used for neurofeedback training can be set by choosing a wave file from this drop-down menu. If the user would like to use a midi sound instead of one of the preset wave files, click on the midi name from this list and then set your midi settings from the midi setup screen below.

2

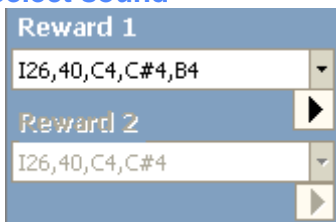
MIDI sound creator

The MIDI setup window is a blue-themed interface. At the top, it says "MIDI setup". Below that is a label "Instrument:" followed by a dropdown menu showing "AcousticGrandPiano". Underneath is a label "Duration:" followed by a numeric input field containing "40" and up/down arrow buttons. To the right of the duration field is a 3x4 grid of buttons for musical notes: C, C#, D, D# in the first row; E, F, F#, G in the second row; and G#, A, A#, B in the third row. Below the duration field is a label "Octave:" followed by a numeric input field containing "4" and up/down arrow buttons. To the right of the octave field are "Clear" and "Stop" buttons. At the bottom left is a label "String:" followed by a text input field containing "I0,40,C". At the bottom right is an "Add to favorites" button and a play button (a right-pointing triangle inside a circle).

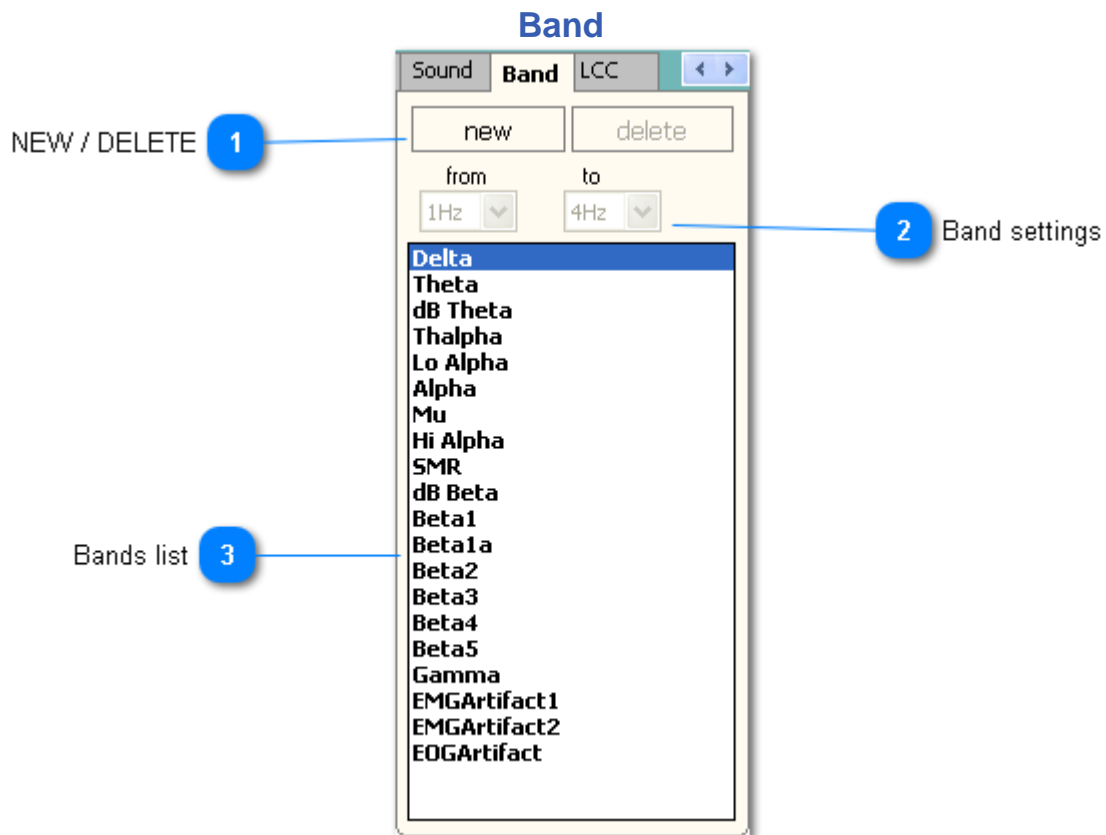
The MIDI setup window allows the user to choose from various instruments and octave settings to save as a MIDI sound for training. The string parameter shows what settings have been selected. The duration of the MIDI sound can also be set in milliseconds from this screen. Once a MIDI sound has been created as a string, you can save the string as a favorite sound, by clicking on the 'add to favorites' button. To test the sound before saving, click on the play button at the bottom right-hand corner to hear the sound from your computer speakers.

3

Select sound

The Select sound window is a blue-themed interface. It has two sections. The first section is labeled "Reward 1" and contains a dropdown menu showing "I26,40,C4,C#4,B4" and a play button to its right. The second section is labeled "Reward 2" and contains a dropdown menu showing "I26,40,C4,C#4" and a play button to its right.

Reward 1 shows the main reward sound for neurofeedback training. It is possible to have two reward sounds (set in the protocol setup), in which case the second reward sound can be designated here as Reward 2.



1

NEW / DELETE

To create a new or custom band for use in neurofeedback training click on the 'new' button. The system will prompt you for a name for the band and then will allow the user to edit the frequency range of that band from the drop-down menus 'from' and 'to'. There are numerous preset bands in the system which are not editable.

2

Band settings

When creating a new band, set the band range by using the 'from' and 'to' drop-down menus.

3

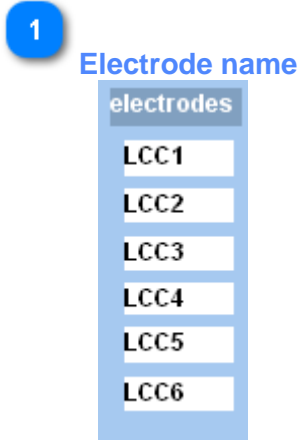
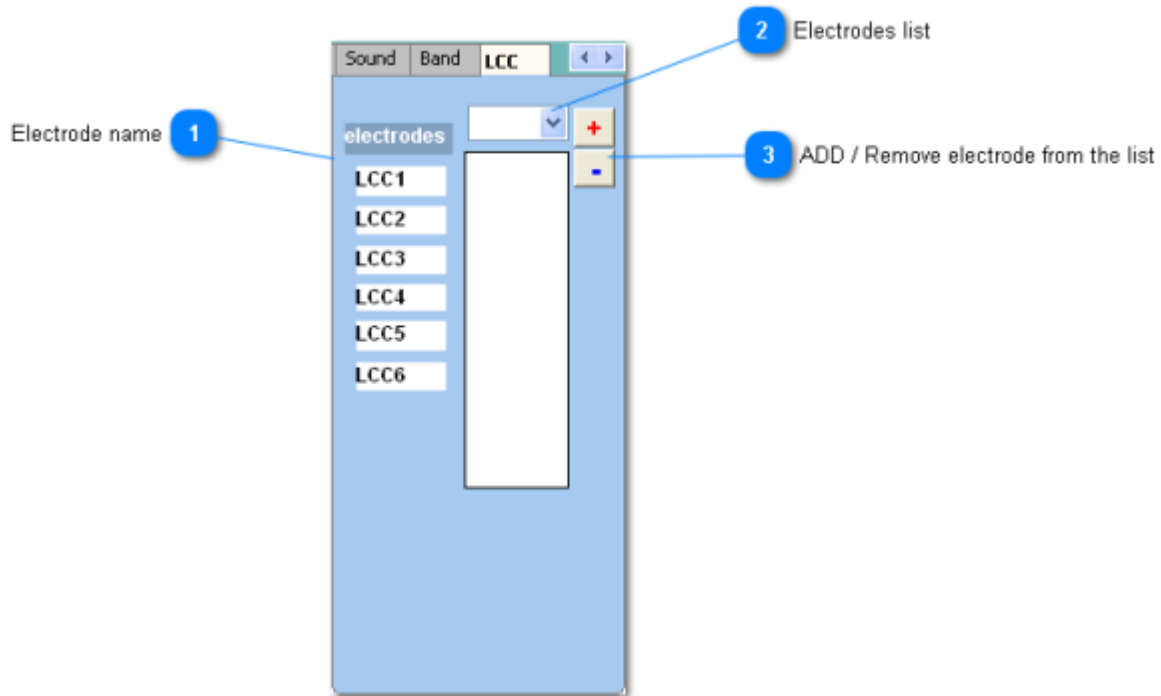
Bands list

Delta
Theta
dB Theta
Thalpa
Lo Alpha
Alpha
Mu
Hi Alpha
SMR
dB Beta
Beta1
Beta1a
Beta2
Beta3
Beta4
Beta5
Gamma
EMGArtifact1
EMGArtifact2
EOGArtifact

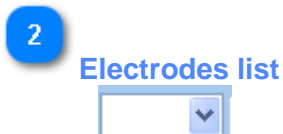
The Bands list shows all bands currently in the system, both preset, and custom.

LCC creator

The LCC Creator allows the user to configure a synthetic electrode for the purpose of combining channels into one training channel or electrode.

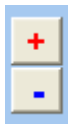


The LCC electrode names are presets but can be edited to any name.



Select all available electrodes from this drop-down list. Click on the desired electrode and press the red '+' to add it to the currently selected LCC channel.

3

ADD / Remove electrode from the list

Use the plus and minus buttons to add or delete individual electrodes from an LCC group.